

WHAT IS CLAIMED IS:

1. A packet tunneling method in a mobile data communication network, comprising the steps of:

(A) using a tunneling protocol to set up tunneling information and uniquely identify a tunnel in a signaling procedure; and

(B) using information provided by an addressing mechanism of a packet itself to tunnel the packet from one routing node to another with the tunneling information and the uniquely identified tunnel provided by step (A) in a data transmission procedure, so as not to use a tunneling protocol in the packet.

2. The packet tunneling method in a mobile data communication network as claimed in claim 1, wherein, in step (B), the addressing mechanism of the packet has a length and identification for being used to replace the length and sequence number required by the tunneling protocol.

3. The packet tunneling method in a mobile data communication network as claimed in claim 1, wherein, in step (A), packet data protocol (PDP) context and mobility management (MM) context on routing nodes of the mobile data network are associated with a unique tunnel identifier to uniquely identify a tunnel.

4. The packet tunneling method in a mobile data communication network as claimed in claim 3, wherein the PDP context has a tunneling PDP address flag, a tunneling PDP address and a PDP address, and one of the tunneling PDP address and PDP address is selected based on the tunneling PDP address flag.

5. The packet tunneling method in a mobile data communication network as claimed in claim 4, wherein the tunnel is uniquely identified by a PDP context activation procedure.

6. The packet tunneling method in a mobile data communication network as claimed in claim 5, wherein, if the PDP context activation procedure requests an dynamic PDP address, the network responses an unused PDP address for being used as a tunnel identifier.

7. The packet tunneling method in a mobile data communication network as claimed in claim 5, wherein, if the PDP context activation procedure requests a static PDP address and the PDP address has been used, the network assigns a tunneling PDP address as a tunnel identifier.

8. The packet tunneling method in a mobile data communication network as claimed in claim 1, which is relied on a general packet radio service (GPRS) system and Internet protocol (IP) based network addressing and routing mechanisms for providing packet transmission service.

9. The packet tunneling method in a mobile data communication network as claimed in claim 8, wherein, in step (B), the addressing mechanism of the packet has a length and identification in an IP header for being used to replace the length and sequence number required by a GPRS tunneling protocol (GTP) of the GPRS system.

10. The packet tunneling method in a mobile data communication network as claimed in claim 8, wherein, in step (A), packet data protocol (PDP) context and mobility management (MM) context on routing nodes of the mobile data network are associated with a unique tunnel identifier

to uniquely identify a tunnel.

11. The packet tunneling method in a mobile data communication network as claimed in claim 10, wherein the PDP context has a tunneling PDP address flag, a tunneling PDP address and a PDP address, and one of the tunneling PDP address and PDP address is selected based on the tunneling PDP address flag.

12. The packet tunneling method in a mobile data communication network as claimed in claim 11, wherein the tunnel is uniquely identified by a PDP context activation procedure.

13. The packet tunneling method in a mobile data communication network as claimed in claim 12, wherein, if the PDP context activation procedure requests an dynamic PDP address, the network responses an unused PDP address for being used as a tunnel identifier.

14. The packet tunneling method in a mobile data communication network as claimed in claim 12, wherein, if the PDP context activation procedure requests a static PDP address and the PDP address has been used, the network assigns a tunneling PDP address as a tunnel identifier.

15. The packet tunneling method in a mobile data communication network as claimed in claim 12, wherein the network has at least a gateway GPRS support node (GGSN) and serving GPRS support node (SGSN) for transmitting packets between a terminal equipment and a mobile station.

16. The packet tunneling method in a mobile data communication network as claimed in claim 15, wherein, when the PDP address is used

as a tunnel identifier and the terminal equipment intends to route packets to the mobile station, the packet from the terminal equipment is first routed to the GGSN where the mobile station locates; then, the packet is processed by the GGSN for replacing the destination address of the packet with a private PDP address of the mobile station; next, the GGSN encapsulates the received packet in IP protocol where the source address is the private address of the GGSN and the destination address is the private address of the SGSN; after the SGSN picks up the packet, the SGSN opens the packet, decodes the destination PDP address, and searches PDP context on a SGSN database based on the PDP address, so as to achieve packet transmission.

17. The packet tunneling method in a mobile data communication network as claimed in claim 15, wherein, when the tunneling PDP address is used as a tunnel identifier and the terminal equipment intends to route packets to the mobile station, the packet from the terminal equipment is first routed to the GGSN; then, the GGSN gets PDP information and replaces the destination PDP address by the tunneling PDP address after checking a PDP context table, and the packet is transmitted to the SGSN; next, the SGSN gets the packet and finds the PDP information by the tunneling PDP address; after checking a PDP context table, the SGSN replaces tunneling address by mobile station's real PDP address, and forwards the packet to the mobile station.

18. The packet tunneling method in a mobile data communication network as claimed in claim 15, wherein, when a mobile station is roaming from a base station system to another one in the same GGSN,

packet transmission is controlled by using a sending N-PDU number and receiving N-PDU number.

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